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VENTILATION OF CHARGING SOCKETS ON ELECTRIC VEHICLES IN FROST AREAS

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VENTILATION OF CHARGING SOCKETS ON ELECTRIC VEHICLES IN FROST AREAS

Technical task:

Frost protection of the charging connections of an electric vehicle.

Initial situation:

Current charging connections on electric vehicles are not sufficiently protected against icing during frost periods. Charging processes, predominantly in the open air, therefore repeatedly result in charging plug systems freezing. Freezing of the entire surface, the individual components or direct snow entry into the plug-in system prevents the charging plug from being plugged in again. If the vehicle battery is empty, this will result in a system failure, a so-called stagnation.

Solution:

The charging connection system on the vehicle side is kept ice-free with the aid of warm air supply before charging or during the entire charging process. The warm air is taken from the standard vehicle heating system, battery preheater, etc. and conducted via a thin hose to the charging plug system. The melting water is discharged via a drainage hole at the lowest point of the charging socket. The ventilation time is controlled by the automatic climate control system. Since networking and taxation will play an increasingly important role in future vehicles, an app-specific control system (e.g. via smartphone) must be urgently considered.

Advantages:

Complex and cost-intensive additional heating elements at the charging socket are not required. In electric vehicles, the heat is generated immediately by electric heating systems. This system can be installed in the modular system regionally where it is needed (warm or cool country-specific weather conditions).

Possible application:

To defrost the plug system (charging socket on the vehicle side), there are ventilation holes (blue) on the socket bottom with a channel (orange) behind them. This is connected to the standard vehicle heating system, battery preheater, etc. via a hose. The heating and de-icing function is switched via an electric solenoid valve between the series heater and the hose. The warm air flows via the hose and the water separator into the channel (orange) at the plug base and can spread evenly over the entire surface of the plug base. The ice or snow there can now defrost and run off via the drainage hole. Control is provided by the vehicle-specific temperature sensor, which switches through from 0° C. The temperature sensor is activated by the vehicle-specific temperature sensor. In addition, there is a humidity sensor (yellow) in the socket, which is connected in series (AND connection). When the temperature has fallen below the threshold and the humidity sensor is switched through, the heating is activated. The heating function is deactivated again by dehumidification and a possible delay circuit (approx. 3 min.).

